

Amendments

Please amend the above-identified U.S. application as follows:

In The Specification

Please amend the portions of the specification as indicated by the following marked up versions thereof:

- 1) Please replace the first full paragraph, lines 4-6, (immediately after the heading "Field of the invention") on page 1, with the following:

The ~~finding~~ invention relates to system of lateral confinement for liquid metal between the crystallising rollers of a continuous casting machine of strips or other metallic products.

- 2) Please replace the second full paragraph, lines 7-11, on page 1 with the following:

The ~~finding~~ invention refers in particular to a connection system between the pressure providing unit and the liquid bath confinement plates which guarantee the most uniform distribution possible on the surfaces of said plates in frictional contact with said rollers and which allow good fitting of said plates with respect to the lateral surfaces of said rollers under all working conditions.

- 3) Please replace the first full paragraph, lines 3-27, on page 2 with the following:

According to a first aspect of the present invention, such a problem is solved by means of a ~~with a molten metal~~ containment device for containment of melt between the crystallising rollers of a continuous casting machine, ~~for metallic products~~, wherein ~~said~~ the crystallising rollers are able to rotate around the two substantially horizontal rotation axes, and are ~~located~~ placed in such positions such as to define between them a zone of minimal distance between the surfaces of said ~~the~~ crystallising rollers and ~~such~~ so to allow, in the space above said zone of minimal distance, the accumulation of a ~~bath of molten metal~~ melt poured from a tundish or other means of distribution, each of ~~said~~ the crystallising rollers comprising one or more shoulder surfaces lying

in a plane normal to the rotation axes ~~of rotation of said the~~ crystallising rollers, ~~said the~~ containment device comprising, on each side of ~~said the~~ crystallising rollers[]:

- [] a lateral containment plate able to ~~make fit~~ fit tightly ~~contact~~ against at least part of each of ~~said~~ the shoulder surfaces, whereby it contains the melt; ~~of said crystallising rollers so as to contain said molten metal bath;~~

~~means of providing pressure~~ pressing means able to move ~~said the~~ lateral containment plate so as to ~~move~~ bring it close to ~~close to and press it firmly~~ hold it tightly against ~~said the~~ shoulder surfaces ~~of both of said crystallising rollers and/or remove said the lateral containment plate from both said the shoulder surfaces; of said crystallising rollers;~~

wherein ~~said the~~ lateral containment plate is fixed to ~~said means of providing pressure~~ the pressing means through an articulated joint,

~~and said containment device is~~ characterised by the fact that the

Said articulated joint comprises an flexible ~~connection~~ connecting element able to ~~support said~~ sustain the lateral containment plate allowing ~~the~~ a horizontal pivoting at least around ~~one axis of pivoting~~ a pivot axis horizontally and substantially ~~not parallel~~ normal to ~~said axis of rotation of said crystallising rollers.~~ the rotation axes.

4) Please delete the third full paragraph, lines 36-37, on page 2 ("In a second aspect . . . the characteristics according to claim 14").

5) Please replace the second full paragraph, lines 4-5, on page 3 with the following:

Other innovative aspects of the present finding invention are expressed in the secondary claims.

6) Please replace the section under the heading "List of the Figures," lines 7-26, on page 3 with the following:

Further advantages deliverable with the present finding invention will be more evident, to the expert in the field, from the following detailed description of an example of a particular embodiment non limiting in character, with reference to the following figures, of which:

Figure 1 shows schematically a three dimensional view of the crystallising rollers and of the lateral

containment plates of a continuous casting plant;

Figure 2 shows schematically a lateral view of a first particular embodiment of a containment device according to the present invention;

Figure 3 shows schematically a frontal view of the device of Figure 2;

Figure 4 shows schematically a lateral view in section of the device of Figure 2;

Figure 4A shows schematically an enlarged detail of the view of Figure 4;

Figure 4B shows schematically a perspective view of the buffer of the device of Figure 2;

Figure 4C shows schematically a front view of the buffer of the device of Figure 2;

~~Figure 6 shows schematically a lateral view of a second example embodiment of a containment device according to the present invention;~~

~~Figure 7 shows schematically a front view of the device of Figure 6;~~

~~Figure 8 shows schematically a lateral view in section of a detail of the device of Figure 6.~~

7) Please replace the first full paragraph, lines 1-6, on page 5 with the following:

The system of plates P1-P3 and of fixing elements 12 is described in more detail in the pending European patent application N° 01120627.3 by the same applicant and is herein described as making part of a preferential and non limiting embodiment of a containment device according to the present invention, but is not an indispensable element for the realisation of the present invention and, without leaving the ambit of the present ~~finding~~ invention, can also be realised in different manners.

8) Please replace the fifth full paragraph, lines 28-33, on page 5 with the following:

Preferably the walls of the tubular sleeve 1 have substantially undulating shape like a bellows and the sleeve 1 is cooled, with an appropriate cooling fluid which runs inside of it, and inside the sleeve 1 is housed an internal body -or buffer- 5 realised for example as a stout body able to fill the internal cavity of the tubular sleeve 1, leaving an appropriate perimeter clearance between the lateral surfaces of the buffer 5 and the interior walls of the tubular sleeve 1.

9) Please replace the third full paragraph, lines 23-27, on page 6 with the following:

To that end the perimeter clearance between the lateral surfaces of the buffer 5 and the inside of the walls of the tubular sleeve bellows 1 is variable along the axis of the cylindrical buffer 5, ~~but ma~~ – with reference to the shape of the undeformed tubular sleeve 15, i.e. not subjected to the weight of the containment plate 47 and its support 2- never less than a minimal distance H -Figure 4A.

10) Please replace the first full paragraph, lines 1-26, on page 7 with the following:

Still with the preferred example embodiment of Figures 4-5, the notched areas 10a, 10b, 10c, 10d of the buffer are aligned along two diametrically opposed linegroups ~~which are found in diametrically opposed positions~~ on the buffer 5 and, ideally moving along the axis of the buffer 5, the notched areas 10a, 10c of a group ~~line~~ are in staggered positions with respect to the notched areas 10b, 10d of the other group ~~line~~ (Figures 4A, 4B –in Figure 4B the height D1, with respect to a base of the cylindrical buffer 5, of the notch 10A is greater than the height D2 of the notch 10B on the opposite side, the height D2 is greater than the height D3 of the notch 10C and the height D3 is greater than the height D4 in relation to the notch 10D) of the notches; in this way the majority of the flux of cooling liquid which exits the through hole 6 into the meatus between the flat end 7 of the buffer and the flange 8, propagating radially towards the outside perimeter of the tubular sleeve 1 enters inside the bellows sleeve 1 and in correspondence with the notch 10a, is divided into two streams which lap for 180° -one stream clockwise, the other anticlockwise- the surfaces of the buffer under the nervature 13a; the two streams reunite in correspondence with the notched area 10b which favours the passing of the stream from the nervature 13a to the nervature 13b; the cooling water is therefore divided into another two streams which lap the surfaces of the buffer 1 for 180° and merge in correspondence with the notched area 10c and so on, until the cooling liquid does not reach the nervature 13d of the bellows and leaves the bellows itself through a series of apertures 14 –for example holes or buttonholes – made in the flange 9 which closes the bellows sleeve 1 along the perimeter of the tubular sleeve 1, inside the sleeve itself; The cooling fluid is therefore collected in a circular collector 15 etched in the steel plate of the second support 3 and emptied through the discharge hole 16, made in the steel plate of the second support 3 and connected to the cooling circuit.

- 11) Please replace the third full paragraph, lines 5-10, on page 8 with the following:

The skilled man expert in the art will know to select appropriately beyond the dimensions of the important project to obtain good cooling of the tubular sleeve 1, such as for example the diameter of the buffer 5, shape and dimensions of the undulations of the bellows sleeve 1, the heights of the notches ~~depths of the peaks~~ 10, the radius of curvature of the troughs 11 of the various undulations of the bellows and the distance between each trough 11 from the related notch ~~peak~~ 10.

- 12) Please replace the fourth full paragraph, lines 11-17, on page 8 with the following:

The bellows like articulated joint ~~44~~ of the present example embodiment other than allowing the oscillations of the containment plate 47 allow the translation in a horizontal direction: in fact, by regulating the pressure of the cooling liquid which fills internally the tubular sleeve 1 with appropriate means of cooling, it is possible to axially dilate the bellows sleeve 1, distancing the two supports 2, 3 or varying the force with which the containment plates 47 press against the shoulders 40, 41 of the crystallising rollers.

- 13) Please replace the sixth full paragraph, lines 25-30, on page 8 with the following:

Preferably, but not necessarily the tubular sleeve articulated joint 1 is located in correspondence with the result of the pressure distribution of the molten metal bath on the containment plates 47, so that such pressure distribution gives rise to a null moment on the plates 47; however, without leaving the ambit of the present invention, the tubular sleeve articulated joint 1 can be placed also in different positions, determined by ~~different criteria~~ different than said general criteria.

- 14) Please replace the seventh full paragraph, lines 31-36, beginning on page 8, and lines 1-2 on page 9, with the following:

Preferably, the oscillations of the first support 2 around the horizontal axis X are however limited to between an appropriate maximum admissible value selected with appropriate means of containment,

for example end point stops and pivots: In the example embodiment of Figures 1-4 such means of containment of the oscillations around the above mentioned axis X are ~~realised~~performed with the three small columns 160 which perform~~realise~~ the mechanical ~~stop~~collisions against which the plate P2 of the first support 2 can rest, or with analogous means to realise mechanical collisions.

15) Please replace the first full paragraph, lines 3-8, on page 9 with the following:

The limited ~~entity of the~~ rotations of horizontal pivoting of the containment plates 47, together with an appropriate sizing of the tubular sleeve 1 and of the buffer 5, allow the limiting of the ~~eccentricity~~perimeter clearance between the tubular sleeve and buffer 5 along the axis of the buffer, avoiding in particular that the tubular sleeve 1 at some point comes into contact with the buffer 5: in this way the flow of cooling fluid is maintained more uniformly inside the tubular sleeve 1.

16) Please replace the third full paragraph, lines 14-26, on page 9 with the following:

An articulated joint for lateral containment plates according to the present invention has the advantage of easily assisting to be cooled internally, for example with water or other cooling liquids; Furthermore, for example with respect to a spherical joint or a traditional type pivot does not require lubrication, allows for minimal hindrance, and consequently to simplify the oxidation protection system of the liquid bath, allows carrying the first support 2 also when the lateral containment plate 47 is not in contact with the flank of the casting rollers. Another important advantage deriving from the use of such an articulated joint is that of approaching the application point of the pushing force to the frictional surfaces between the refractory ~~skate~~plate and the casting ~~cylinder~~roller, minimising in such a manner the moment exercised by the result of the frictional force with respect to the centre of the tubular sleeve 1. I.e. allowing to have the vector of action of the result of the pressure of contact closer to the vector of action of the pushing force.

17) Please delete the fourth full paragraph, lines 27-29, on page 9 ("An alternative example embodiment . . . shown in Figures 6-8.")

18) Please delete the fifth full paragraph, lines 30-37, on page 9 ("According to such an example embodiment, . . . a force with at least horizontal components.")

19) Please delete the first full paragraph, lines 1-5, on page 10 ("In the preferred example embodiment of Figures 6-8 . . . of said containment plate 47.")

20) Please delete the second full paragraph, lines 6-16, on page 10 ("As shown in Figure 8, . . . already mentioned more above.")

21) Please delete the third full paragraph, lines 17-18, on page 10 ("Each support element 20 . . . with a flow of inert gasses.")

22) Please delete the fourth full paragraph, lines 19-24, on page 10 ("Also in this embodiment . . . of appropriate and different type.")

23) Please replace the fifth full paragraph, lines 25-31, on page 10 with the following:

Clearly the devices previously described as non limiting examples ~~isare~~ susceptible to numerous variations and modifications, without leaving the ~~ambitscope~~ scope of the present ~~findinginvention~~ invention for this: for example the tubular sleeve can have one or more nervatures 13a which turn screw like and extend from one end to the other of the sleeve, rather than have a plurality of circular nervatures 13a-13d separated between them and closed on themselves; in such a case the lateral walls of the buffer 5 can be free from notches 10a-10d.

24) Please replace the sixth full paragraph, lines 32-36, on page 10 with the following:

The notched areas 10a, 10b, 10c, 10d when present can be located variably on the external surface of the buffer 5, for example gathered in two groups, each of which is found on one side of the buffer 5 opposite to the side on which is found the other group, and not necessarily aligned along two diametrically opposed rows~~lines~~.

25) Please replace the first full paragraph, lines 1-2, on page 11 with the following:

It is additionally clear that in the ~~ambit~~ scope of the present ~~finding~~ invention are included all the equivalent embodiments.